EXHIBIT H

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TITLE: G.gen, G.dmt.bis, G.lite.bis: Protocol for On-Line Reconfiguration of ADSL

ABSTRACT

This document contains discussion and proposed text for the control of On-Line Reconfiguration (OLR) actions based at the physical layer. Programmable timers are used in the proposed protocol for OLR to achieve increased robustness and maximum flexibility in handling the wide variety of potential OLR applications. In addition, this protocol is explored using examples for each of the relevant actions including Bit Swap, Seamless Rate Adaptation, and Dynamic Rate Repartitioning. This proposal merges agreements with concepts from prior contributions RN-046 and RN-094.

1. Introduction

Contributions RN-046 and RN-094 discussed the protocol for On-Line Reconfiguration of the physical layer in ADSL. These contributions addressed complementary issues and have been further explored to provide a complete protocol proposal for the G.gen project. This contribution merges key points and agreements from each of these previous contributions and provides additional enhancements to the OLR protocol. The resulting protocol provides significant robustness and flexibility in handling the wide variety of OLR applications.

2. Protocol Definitions

2.1. Types of On-Line Reconfiguration (OLR)

The term On-Line Reconfiguration (OLR) is a general term used to encompass a number of specific PMD and PMS-TC reconfigurations. There have been three specific applications of OLR proposed in past contributions. These applications (in order of increasing modification of the PMD and PMS-TC layers) are: Bit Swapping, Dynamic Rate Repartitioning (DRR) and Seamless Rate Adaptation (SRA).

Bit Swapping (BS) reallocates data and power amongst the DMT tones without modification of the higher layer features of the physical layer. Bit Swapping reconfigures the bits and fine gain (b_i, g_i) parameters without changing any other PMD or PMS-TC parameters. This means that after a Bit Swap the total data rate (ΣL_p) is unchanged and that data rate on each latency path (L_p) is unchanged as well. Bit Swapping is usually the simplest form of On-Line Reconfiguration as its modifications are limited to the PMD layer and require updating of only a small number of parameters (bits and fine gains of tones being modified). As a result, an ATU responding to a Bit Swap request can often initiate the Bit Swap reconfiguration within a very short period of time. As many Bit Swaps may be required in a short period of time, a key feature of the OLR protocol should be to process Bit Swap OLRs in a minimum amount of time.

Dynamic Rate Repartitioning (DRR) is used to reconfigure the data rate allocation between multiple latency paths by modifying (L_i). A DRR can (but is not required) also include a change in the b_i, g_i parameters reallocating bits among the active tones. DRR does not modify the total data rate (ΣL_p) but does modify the individual latency path data rates (L_i). Finally a DRR can (but is not required) also include a change in the number of octets from the n-th frame bearer per Mux Data Frame on the p-th latency path B_{pn}. Changing the octets per bearer Mux Data Frame is done to retain the same ratio (S) between Mux Data Frames and DMT symbols across the DRR event. DRR is usually more involved and complex than Bit Swapping as it typically involves modifications to PMD, PMS-TC and/or TPS-TC parameters. The

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